vernment must undertake some great expedition against all the Indians of the plains. It may be possible to civilize Creeks, Choctaws, Cherokees, etc., but with a Cheyenne or Camanche or Apache the attempt will surely fail. The hands of these Indians ever have been and ever will be against every man. They are the professed exponents and great advocates of barbarism and universal ignorance. In view of any such plan of a general civilization of these tribes we think it should be the care of those who control such things to provide, as far as possible, for the safety of the soldier. We are certain that if suitable bulls' hide cuirasses were provided fatal wounds from arrows would become very rare. In all commands engaged against Indians an order should be issued warning the men of the danger of attempting to extract an arrow, and directing them in all such cases to go at once to the surgeon in attendance for assistance. From what has been already written, it is easy to see how great an advantage such a course will give a surgeon in the treatment of the injury.

FORT CRAIG, NEW MEXICO, Jan. 1, 1862.

ART. III.—*Inoculating the Human System with Straw Fungi, to protect it against the Contagion of Measles; with some Additional Observations relating to the Influence of Fungoid Growth in producing Disease and in the Fermentation and Putrefaction of Organic Bodies.* By J. H. SALISBURY, M. D., of Newark, Ohio.

IN the July number of this *Journal*, I presented some remarks on fungi, with an account of experiments showing the influence of straw fungi upon the human system, etc. At that time I had inoculated but thirteen cases. Since then there have been inoculated 27 additional cases, all of which were situated under the most favourable circumstances for testing rigidly the prophylactic virtues of inoculation with straw fungi, in protecting the human system from the contagion of measles.

About the 30th of May, 1862, measles made their appearance among the boys of the Ohio State Reform Institution, situated in Fairfield County, Ohio. They were introduced into the establishment by a boy who was taken into it before he had entirely recovered from the disease. The officers in charge were not acquainted with the fact till it was too late to remedy it.

June 2d, Drs. Effinger and Boerstler, of Lancaster, O., were called to examine the first cases. They at once pronounced the disease measles. June 4th, I received the following letter from Dr. Boerstler.

LANCASTER, June 2d, 1862.

My dear Sir: Sorry you have left. To-day was called in consultation, to Reform Farm, where they have 175 boys, twelve taken down with

rubeola, many more to take it. I hunted the farm over for fungi. No straw. Got very poor mould of clover. Had Dr. Effinger to introduce it into three boys, all of whom sleep in the room where those do who have the disease. No better opportunity to test; I wish I only had good fungi from straw. Will hunt it up, and try fairly. I wish you were here to experiment for weeks. Will give you the desired information as soon as at leisure.

I am truly yours,

Dr. J. H. SALISBURY, Newark, O. BOERSTLER.

On June 5th, I started for Lancaster, and arrived there about noon. Saw Dr. Boerstler, and made arrangements to visit the State Farm with Drs. Effinger and Boerstler on the following morning, June 6th. I had with me mould from wheat and rye straw which was grown in a box in my office. The fungi were grown about three weeks previously, and had been left in the box—in a mature state—upon the straw. The whole plants with the spores were carefully removed from the straw and placed between plates of glass on the 3d of June.

On the morning of June 6th, we repaired to the State Farm. Professor Howe, principal of the institution, had kindly extended to Dr. Effinger, the attending physician, and Dr. Boerstler every facility the case in hand afforded for testing the prophylactic virtues of straw fungi in protecting the human system from the contagion of measles.

We accordingly selected twenty-six fine healthy boys, who had never had the disease, and inoculated them. There were 175 boys in the institution, ranging in age from eleven to sixteen; and these were divided into four families, each family occupying a building by itself. In each building was one large sleeping room, in which all of a single family slept. Cases of measles had occurred in every family, exposing every boy in the establishment to the contagion of the disease. Twelve boys had already had the measles, and were so far recovered as to be out, and six were still in bed with the disease.

Cases Inoculated.—CASE I. Fred. Abraham (Cuyahoga family).
June 6. Inoculated with rye straw fungi.
9*th.* Redness of inoculating wound slight. Blotch two lines in diameter; no red lines radiating from wound.
12*th.* Blotch dried. Well.
15*th*, 16*th*, 19*th*, and 24*th*. Well.
July 22*d.* Has had no symptoms of measles.

CASE II. Albert Kelso. (Cuyahoga family.)
June 6. Inoculated with fungi of rye straw.
9*th.* Redness slight. Blotch four lines in diameter; red lines radiating from the wound. Eyes slightly vascular.
12*th.* Blotch dried; had cough and coryza.
15*th*, 16*th*, 19*th*, and 24*th*. Well.

CASE III. Silas Pond. (Scioto family).
June 6. Inoculated with fungi of rye straw.

9th. Well, and out with force; was not seen.
12th. Well; out with force; was not seen.
15th. Well. Blotch dried.
16th, *19th*, and *24th.* Well.

CASE IV. Edward Blakeley. (Scioto family.)
June 6. Inoculated with fungi of rye straw.
9th. Inoculating wound red. Blotch four lines in diameter; red lines radiating from wound.
12th. Well; out with force; was not seen.
15th. Blotch dried and well.
16th, *19th*, and *24th.* Well.

CASE V. August Gibing. (Scioto family).
June 6. Inoculated with fungi of wheat straw.
9th. Redness slight; no red lines radiating from the wound.
12th. Well; out with force; not seen.
15th. Well; blotch dried.
16th, *19th*, and *24th.* Well.

CASE VI. Levi Wilson. (Hocking family).
June 6. Inoculated with fungi of wheat straw.
9th. Well; out with force; was not seen.
12th. Well; out with force; was not seen.
15th. Well; blotch dried.
16th, *19th*, and *24th.* Well.

CASE VII. Thomas Collins. (Cuyahoga family).
June 6. Inoculated with the fungi of wheat straw.
9th. Working well; blotch four lines in diameter; red lines radiating from the wound.
12th. Blotch dried and well.
15th. Well; at work with the force; not seen.
16th, *19th*, and *24th.* Well.

CASE VIII. Barner Greener. (Cuyahoga family).
June 6. Inoculated with fungi of wheat straw.
9th. Doing well; blotch four lines in diameter; red lines radiating from the wound.
12th. Well; working with the force; not seen.
15th. Well; blotch dried.
16th, *19th*, and *24th.* Well.

CASE IX. James Hill. (Scioto family).
June 6. Inoculated with fungi of wheat straw.
9th. Blotch the size of a five cent piece. Red lines radiating from the wound.
12th. Well; working with the force; not seen.
15th. On the night of the 12th an eruption appeared in patches on his arms; it appeared next on his face; next on his legs and thighs; and lastly on his breast; sickness slight.
16th. The blotches were about one line in diameter, circular, and about half an inch apart. They were distributed in patches over the whole body. The eruption was still plainly visible on the face and body. There was no smell whatever to the disease. Sickness slight from the commencement.
19th and *24th.* Well, and working with force.

CASE X. George Brown. (Scioto family).
June 6. Inoculated with fungi of wheat straw.
9*th.* and 12*th.* Well; working with force; not seen.
15*th.* Well; blotch dried.
16*th*, 19*th*, 24*th.* Well.

CASE XI. Joseph Townsend. (Scioto family).
June 6. Inoculated with fungi of wheat straw.
9*th.* Blotch small; slight red lines radiating from the wound.
12*th.* Blotch dried; had some cough and coryza.
15*th*, 16*th*, 19*th*, and 24*th.* Well.

CASE XII. Miles Parmeter. (Cuyahoga family).
June 6. Inoculated with fungi of wheat straw.
9*th* and 12*th.* Well; working with force; not seen.
15*th.* Well; blotch dried.
16*th*, 19*th*, and 24*th.* Well.

CASE XIII. John Lawrence. (Scioto family).
June 6. Inoculated with fungi of wheat straw.
9*th.* Doing well; blotch four lines in diameter; red lines radiating from the wound. Eyes vascular.
12*th.* Well; working with field force; not seen.
15*th.* Well; blotch dried.
16*th*, 19*th*, and 24*th.* Well.

CASE XIV. Thomas J. Fransted. (Scioto family).
June 6. Inoculated with fungi of rye straw.
9*th.* Blotch looks well; size of a three cent piece; red lines radiating from the wound; eyes sensitive.
12*th.* Well; working with force in field; not seen.
15*th.* Well; blotch not quite dried.
16*th*, 19*th*, and 24*th.* Well.

CASE XV. George Nestine. (Muskingum family).
June 6. Inoculated with fungi of rye straw.
9*th.* Working, well; blotch 4 lines in diameter; red lines radiating from the wound; eyes vascular.
12*th.* Well; working with field force; not seen.
15*th.* Well; blotch dried.
16*th*, 19*th*, and 24*th.* Well.

CASE XVI. James Galvin. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th.* Blotch looks well; 4 lines in diameter; red lines radiating from the wound.
12*th.* Well; working with field force; not seen.
15*th.* Blotch dried; has cough and coryza.
16*th.* Has cough and coryza; slightly sick; in bed for 24 hours; no blotches.
19*th.* Well. Has had no blotches. Was well and out working with the force on the 17th.
24*th.* Well.

CASE XVII. John Boyd. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch looks well; size of a three cent piece; red lines radiating from the wound; eyes vascular.
12*th*. Well; working with the force; not seen.
15*th* and 16*th*. Has cough and coryza; fever; headache; lassitude; slightly sick; no eruption. Was in bed 1½ day.
19*th* and 24*th*. Has been well since the 17th, working with the field force.

CASE XVIII. George Harmis. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch 4 lines in diameter; red lines radiating from the wound; eyes vascular.
12*th*. Well; blotch dried.
15*th*, 16*th*, 19*th*, and 24*th*. Well.

CASE XIX. Edward Smith. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch 3 lines in diameter; red lines radiating from the wound.
12*th*. Well; working with field force; not seen.
15*th*. Well; blotch dried.
16*th*, 19*th*, and 24*th*. Well.

CASE XX. Jacob Myres. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th* and 12*th*. Well; working with field force; not seen.
15*th*. Well; blotch dried.
16*th*. Headache; some fever; cough and coryza; in bed for 1 day; no eruption.
19*th* and 24*th*. Has been well and working with the force since June 17th. Has had no eruption.

CASE XXI. Wm. Dayton. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch looking well; 3 lines in diameter; red lines radiating from the wound; eyes vascular.
12*th*. Well; working with field force; not seen.
15*th*. Well; blotch dried.
16*th*, 19*th*, and 24*th*. Has been well since the 15th. No signs of measles.

CASE XXII. Charles Ryan. (Muskingum family.)
June 6. Inoculated with rye straw fungi.
9*th*. Blotch small; slight red lines radiating from wound.
12*th*. Well; blotch dried.
15*th* and 16*th*. Coughing and coryza; with pains in head.
19*th*. Broke out with what was supposed to be measles; eruption was not carefully examined; was not much sick; this is a scrofulous subject and has sore eyes.
24*th*. Well; and working with force.

CASE XXIII. Milan Goldsboro. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch three lines in diameter; red lines radiating from the wound; eyes vascular.

12*th*. Well; blotch dried.
15*th*, 16*th*, 19*th*, and 24*th*. Well; no symptoms of measles yet.

CASE XXIV. Beaumont Byers. (Muskingum family.)
June 6. Inoculated with the fungi of rye straw.
9*th*. Blotch four lines in diameter; looks well; red lines radiating from the wound; eyes vascular.
12*th*. Well; blotch dried.
15*th*, 16*th*, and 19*th*. Well; working with field force; not seen.
24*th*. Eruption first noticed on face, breast, and arms June 21st. June 24th, eruption declined, leaving obscure blue blotches over whole body; eyes red; some cough and coryza; sickness slight.

CASE XXV. Wm. Hancock. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Blotch looks well; three lines in diameter; red lines radiating from the wound; eyes vascular.
12*th*. Well; blotch dried.
15*th* and 16*th*. Well; working with field force.
19*th*. Eruption appeared first on the 17th on the face; 18th and 19th broke out on body; eruption is in patches; but slightly sick.
24*th*. Well; working with field force.

CASE XXVI. Vinton Ryder. (Muskingum family.)
June 6. Inoculated with fungi of rye straw.
9*th*. Working well; blotch three lines in diameter; red lines radiating from the wound.
12*th*. Well; working with field force; not seen.
15*th* and 16*th*. Well; blotch dried.
19*th* and 24*th*. Well; working with field force; no symptoms of measles yet.

CASE XXVII. John Tully.
June 9. Inoculated with fungi of rye straw.
12*th*. Well; working with field force; not seen.
15*th*. Well; blotch dried.
16*th*, 19*th*, and 24*th*. Well; no signs of measles yet.

Visited the institution again with Dr. Effinger July 22d. The measles had all disappeared some ten days previously. About fifty cases of the disease had occurred in the establishment since June 24th, but none of them among the twenty-seven boys that were inoculated. They had all been well, though constantly exposed to the contagion. The red lines radiating from the inoculating wounds could not be well seen without the aid of an eye-glass.

June 9th, three days after the inoculation, Dr. Boerstler and myself saw the cases and inoculated another boy. None had symptoms of measles.

June 12th, Drs. Effinger and Boerstler saw the cases and made the report of that date.

June 15th, Dr. Effinger saw the cases and reported their condition. One of the boys, James Hill, was broken out and in bed. The eruption first made its appearance upon the night of the 12th of June. Dr. Effinger

did not notice the case very particularly; he only observed that he was broken out, and not very sick.

June 16th, I saw the cases. None of those who had been inoculated were broken out, except James Hill, noticed by Dr. Effinger on the 15th. The blotches, which had not yet disappeared from his face, were about one line in diameter, circular in form, and scattered in patches over the whole body. The individual blotches were about one-half an inch apart. There was no odour whatever to the disease. The eruption made its appearance first in irregular patches, on the arms; next on the face; then on the legs and thighs; and lastly, on the breast. The blotches were small, circular, and in patches over the whole body; sickness slight.

I do not look upon this case as one of genuine measles; it may have been the disease, modified by the inoculation. This can only be settled by further experience in similar experiments.

June 19th, Dr. Effinger saw the cases and made the report of that date. Two more cases, Charles Ryan and Wm. Hancock, were broken out. Wm. Hancock broke out on the 17th on his face, and on the 18th and 19th on the body; eruption in patches. Charles Ryan broke out on the 18th and 19th. He is scrofulous, and has chronic sore eyes.

June 24th, Dr. Effinger saw the cases and reported one more boy, Beaumont Byers, down with what appeared to be measles. June 21st, the eruption was first noticed on face, breast, and arms. On the 24th it had declined, leaving obscure blue blotches over the whole body. Some cough and coryza, and eyes red.

Several of the boys (as will be seen by reference to the notes) who were inoculated, were affected, between the appearance of the eruption on James Hill and that on Beaumont Byers, with headache, cough, coryza, and lassitude, so that they took to their beds for from one to two days; but there was no eruption, and but slight fever. The four cases where eruption occurred appeared to be modified types of the disease.

The institution being some seven miles from town, and no physician on the ground, the cases where eruption occurred could not be studied sufficiently in detail, so as to determine whether they presented marked peculiarities in type, to indicate the degree that the inoculation had modified the disease.

It is through the efforts and kindness of my learned friends Drs. Boerstler and Effinger, of Lancaster, Ohio, that I am able to present so fine a list of cases, all occurring under such favourable circumstances, for testing the virtues of straw fungi as a prophylactic in measles. I am under obligations to them for their interest, zeal, and valuable labours in these experiments.

Dr. Boerstler reports the following, which he received at the Ohio State Medical meeting at White Sulphur Springs, June, 1862, from his friend, Dr. Gordon, of Georgetown, Brown County, O. "Dr. Gordon has visited

ninety military camps, and states that rubeola originated and existed in every instance where the soldiers slept upon damp straw; and so far as he knew, not a solitary case of rubeola occurred in any camp where the soldiers did not sleep upon straw."

In the year 1847, rust attacked the wheat crop quite generally throughout Central Ohio. Mrs. J. J. Brasee, of Lancaster, Ohio, states that one Henry Bowers worked as a farm hand for her husband, Hon. J. T. Brasee, during that year; and that during wheat harvest, he (Bowers) was affected with sore throat, cough, sore eyes, headache, high fever, red face and a feeling of weariness and depression. Upon Mrs. Brasee asking him what was the matter, he (Bowers) stated that he had been working in the wheat field, harvesting; and that his sickness was produced by the rust on the wheat. That others working with him were affected in the same way.

The following interesting letter is from Dr. Boerstler.

LANCASTER, June 10, 1862.

Dr. Salisbury—Dear Sir: In compliance with your request, I make the following statement: In my native county of Washington, Maryland, the hay and grain harvest usually lasts from four to six weeks, and attracts from the mountain regions a thousand labourers. During the harvest of 1828 or 1829, the year I do not distinctly remember, we had rust in a number of wheat fields, and amongst the harvesters in those fields, the measles appeared. The occurrence of measles in midsummer is very unusual, unless the contagion has been transmitted from early spring. We had, previous to harvest, no measles in the county, and no cause could then be assigned. Since the fungoid theory has been broached, is it not probable that the rust on the wheat may have produced the disease? This is a subject of deep interest, and you have my thanks for your persistent efforts in its prosecution.

I am, dear sir, respectfully yours,
G. W. BOERSTLER, M. D.

In Berkeley's able work on *Cryptogamic Botany*, it is stated that in reed beds (South) where the stems are affected with a rust or fungous growth, (ustilago Typhoides) the workmen suffer from headaches and other bad symptoms, in consequence of inhaling the abundant spores. On account of the peculiar symptoms produced (of a typhoid character), it has received the specific name Typhoides. This fungus comes under the group *Coniomycles*. The parasitic rusts and mildews come under the same group.

It is an interesting fact that in those regions where the atmosphere is dry and rain seldom falls, organic decay and fermentation are tardy and imperfect, fungi are not produced and lung diseases are unknown, except as importations. Diseased lungs are quickly restored to health. All meats are cured by jerking (cutting in strips and drying); and dead bodies become soon dry and mummified, without being affected with decomposition.

I am engaged in some experiments which will soon be ready for the press, connected with fermentation, decay, and fungoid development, which throw interesting light upon this matter.